

AP Statistics - Conditional Probability and Independence - Test Answer Key

Common Core AP STAT 4.5, AP STAT 4.6, HSS-CP.A.2, HSS-CP.A.3, HSS-CP.A.4, HSS-CP.B.6, HSS-CP.B.8 · maths-pdf.fr/en/

Each solution includes a scoring guide. Award points for the correct denominator, the correct multiplication along branches, and a clear conclusion about independence in context.

AP Statistics · Common Core State Standards: **AP STAT 4.5, AP STAT 4.6, HSS-CP.A.2, HSS-CP.A.3, HSS-CP.A.4, HSS-CP.B.6, HSS-CP.B.8**

Question 1 - Conditional from a table [3 pts]

Likes	Boys	Girls	Total
Yes	24	36	60
No	16	24	40
Total	40	60	100

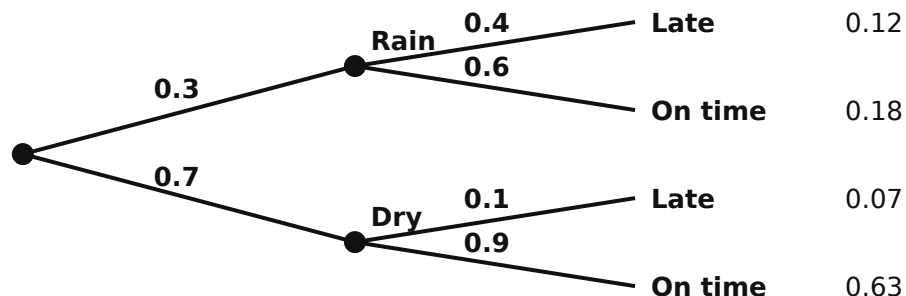
Opinion by sex.

(a) $\frac{36}{60} = 0.6$. (b) $\frac{36}{60} = 0.6$. (c) $P(\text{likes}) = 60/100 = 0.6 = P(\text{likes} \mid \text{girl}) = P(\text{likes} \mid \text{boy}) = 24/40 = 0.6$.

0.6; 0.6; yes, independent.

Scoring: 1 point per part.

Question 2 - Tree diagram [4 pts]



A tree for bus arrival.

(a) $0.3 \times 0.4 = 0.12$. (b) $0.12 + 0.07 = 0.19$. (c) $\frac{0.12}{0.19} \approx 0.632$.

0.12; 0.19; 0.632.

Scoring: 1 point each for (a) and (b); 1 point for the setup and 1 point for 0.632 in (c).

Question 3 - Independence [3 pts]

(a) $0.5 + 0.2 - 0.6 = 0.1$. (b) $0.5 \times 0.2 = 0.1$, so yes. (c) No, since $P(A \text{ and } B) = 0.1$ is not 0.

0.1; independent; not mutually exclusive.

Scoring: 1 point per part.

Question 4 - Without replacement [2 pts]

$$\frac{5}{8} \times \frac{4}{7} = \frac{20}{56} = \frac{5}{14}.$$

5/14, about 0.357.

Scoring: 1 point for the two fractions, 1 point for the product.

Question 5 - At least one [2 pts]

Miss both: $0.25^2 = 0.0625$. At least one: $1 - 0.0625 = 0.9375$.

0.9375.

Scoring: 1 point for the complement, 1 point for 0.9375.

Question 6 - Explain the difference [2 pts]

A and B can occur together (rolling a 6 is even), so they are not mutually exclusive. $P(B | A) = 1/3$ but $P(B) = 1/6$, so they are not independent either.

Independent: $P(B | A) = P(B)$. Mutually exclusive: they cannot both happen.

Scoring: 1 point for each correct explanation.

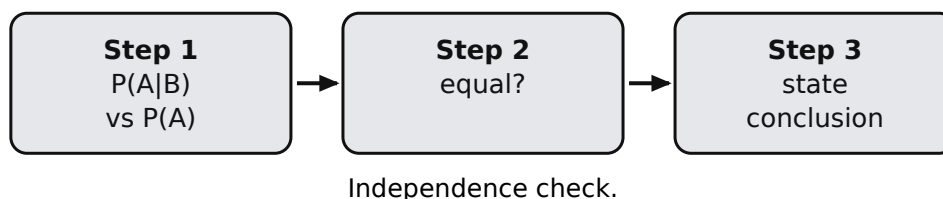
Question 7 - Medical test [3 pts]

$$P(+) = 0.05(0.90) + 0.95(0.08) = 0.045 + 0.076 = 0.121. \quad P(C|+) = \frac{0.045}{0.121} \approx 0.372.$$

0.121 and about 0.372.

Scoring: 1 point for the two products, 1 point for $P(\text{positive})$, 1 point for the conditional.

Question 8 - Read the notation [1 pt]



It is the probability that it rained, given that the bus was late.

The probability of rain given a late bus.

Scoring: 1 point for a correct reading that conditions on 'late'.

Total
20 points